

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A lift drive comprising:
 - 5 a spiral drive element having an axis of rotation;
a rack having teeth sized and shaped to be engaged by said spiral drive element, said rack having a longitudinal axis parallel to said axis of rotation; and
 - 10 a motor to rotate said spiral drive element, wherein upon said spiral drive element rotating, one of said spiral drive element and said rack moves relative to the other along said longitudinal axis.
- 15 2. A lift drive as claimed in claim 1 wherein said spiral drive element moves and said rack is stationary.
3. A lift drive as claimed in claim 1 wherein said spiral drive element includes between one and twelve generally spiral drive threads, each of said drive threads engaging at least one of said rack teeth.
- 20 4. A lift drive as claimed in claim 2 wherein there may be at least one of said threads engages at least two teeth at once.
- 25 5. A lift drive as claimed in claim 2 further including a moveable carriage, said motor and said spiral drive element being mounted onto said carriage.
6. A lift drive as claimed in claim 5 wherein said carriage includes a plurality of wheels and said rack is fixed to a rail, wherein said rail includes wheel guides to guide said wheels along said rail.
- 30 7. A lift device as claimed in claim 2 wherein each of said teeth includes a thrust surface sized and shaped to engage at least one of spiral drive

threads of said spiral drive element.

8. A lift device as claimed in claim 1 wherein said rack includes teeth that are spaced apart by a distance "a" and the number of teeth passed per revolution of said spiral drive element is determined by the number of threads on said spiral drive element, wherein the speed of said movement along said longitudinal axis is proportional to the number of spiral drive threads as well as the spacing "a" of said teeth.

9. A lift device as claimed in claim 1 wherein said device further includes a gearbox to operatively couple said motor to said spiral drive element, whereby said spiral drive element is rotated at a speed suitable from producing an acceptable linear speed for said drive element along said track.

10. A lift device as claimed in claim 9 wherein said motor has a predetermined output speed, and said spiral threads of said spiral drive element have a preselected pitch, having regard to said speed of rotation of said drive element and said tooth spacing to drive said carriage along said rack at a predetermined speed.

11. A lift device as claimed in claim 3 wherein said linear drive has a predetermined load capacity, and sufficient number of spiral drive threads are provided to permit enough teeth to be simultaneously engaged to support said load capacity together with a reasonable factor of safety.

12. A lift device as claimed in claim 11 wherein said factor of safety is at least 1.5.

13. A lift device as claimed in claim 1 wherein said spiral drive element and said teeth are selected from materials having a low coefficient of friction.

14. A lift device as claimed in claim 13 wherein said coefficient of friction is between 0.03 and 0.18.

15. A lift device as claimed in claim 14 wherein both said spiral drive element and said teeth are made from plastic.

16. A lift device as claimed in claim 15 wherein said spiral drive thread is made from oil impregnated plastic.

17. A lift device as claimed in claim 16 further including a gear box between said motor and said spiral drive element, said gear box providing a speed reduction of between about 8 to 1 and 60 to 1.

18. A lift device as claimed in claim 17 wherein said gear box and spiral drive have a combined efficiency of between 35% to 88%.

19. A lift device as claimed in claim 18 wherein said worm drive element and said rack have an efficiency of between 70% and 86%

20. A drive device for lifting loads comprising:
a moveable carriage having wheels;
a motor carried by said carriage, said motor having an output shaft;
a gearbox attached to said output shaft to reduce a speed of revolution transmitted by said motor, such gearbox being configured for maximum efficiency,
a threaded spiral drive element attached to and driven by an output shaft of said gearbox; and
a fixed rack having teeth sized and shaped to be engaged by said threaded spiral drive element,
wherein upon said motor being activated said spiral drive element drives said carriage longitudinally along said rack.

21. A drive device as claimed in claim 20 wherein said fixed rack and said threaded spiral drive element are made from lightweight materials.

5 22. A drive device as claimed in claim 21 wherein said fixed rack and said threaded spiral drive element are made from plastic.

23. A drive device as claimed in claim 22 wherein at least one thread of said threaded spiral drive element is sized and shaped to engage more than
10 one tooth of said rack to distribute the load being lifted.

24. A drive device as claimed in claim 20 wherein said spiral drive element includes more than one thread to simultaneously engage more than one tooth of said rack to distribute the load being lifted.